

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (currently amended) A self-contained, practical robotic device energized by a power source and adapted to interact with objects comprises:
 - a base,
 - at least one finger mounted on said base having at least first and second links rotatably connected in series to one another at a rotary joint and connected at a proximate end of said first link to the base, said at least one finger having at least two degrees of freedom associated with at least two of said rotary joints,
 - an actuator mounted on said robotic device at each said rotary joint [[and]], said actuator being a source of motive force operable to [[move]] produce movement of an associated link about the associated one of said rotary joint,
 - an electronic controller located proximate each of said actuators to control and power the associated one of said actuators,
 - wiring within said robotic device that connects said controllers and said associated actuators to the power source and interactively connects said controllers to one another on a shared bus to form a distributed control network, and
 - a network operating controller interactively connected by said wiring to all said actuator controllers, said network operating controller coordinating the operation of said actuators through said distributed network of said actuator controllers.
2. (previously presented) The self-contained, practical robotic device of claim 1 further comprising at least one sensor mounted on the robotic device that produces an output electrical signal responsive to a sensed operating parameter of the robotic device, and said output signal is input to said distributed network of controllers.
3. (original) The self-contained, practical robotic device of claim 1 wherein said wiring comprises one to five wires through said network serially connecting said actuator and network controllers.

4. (currently amended) The self-contained, practical robotic [[hand]]device of claim 1 wherein the power source is electrical and wherein said wiring comprises two signal wires and two power wires.
5. (original) The self-contained, practical robotic device of claim 1, wherein said at least one finger comprises at least two fingers and each has at least two links serially connected by said rotating joints.
6. (original) The self-contained, practical robotic device of claim 1 wherein said rotating links are electrically connected across the associated rotary joint.
7. (original) The self-contained, practical robotic device of claim 1 wherein said controllers and their interactive networking function as said network controller.
8. (original) The self-contained, practical robotic device of claim 1 wherein said network controller is an electronic device distinct from said actuator controllers.
9. (original) The self-contained, practical robotic device of claim 1 wherein said coordination of operation includes an allocation of power to each actuator from the power source.
10. (original) The self-contained, practical robotic device of claim 2 wherein said at least one sensor includes transducers and transducer arrays wherein said electrical input signal of each said transducer is responsive to one or more parameters selected from the group consisting of proximity, torque, force, pressure, actuator position, actuator power usage, actuator current, voltage, vision, radiation, acidity, gravity vectors, acceleration, spectrum analysis, and temperature.
11. (original) The self-contained, practical robotic device of claim 1 wherein said actuators are brushless motors.

12. (original) The self-contained, practical robotic device of claim 11 wherein said actuators include a worm drive coupling each of said brushless motors to one of said links to rotate it at the associated one of said joints.

13. (original) The self-contained, practical robotic device of claim 5 wherein the base has a palm surface generally aligned with an X-Y plane and further comprising object gripping pads replaceably secured on said palm surface and at least one of said links.

14. (original) The self-contained, practical robotic device of claim 13 wherein one or more of said pads include V-grooves adapted to grip and locate the objects therein.

15. (original) The self-contained, practical robotic device of claim 5 wherein the outermost link on each of said fingers is inwardly angled.

16. (original) The self-contained, practical robotic device according to claim 1 wherein said base has a surface adapted to engage and grip the object in cooperation with a gripping of the objects by said at least one finger.

17. (previously presented) The self-contained, practical robotic device of claim 16, wherein said base has a gripping surface extending generally in an X-Y plane, and wherein said at least one finger comprises at least two fingers with one finger fixed at its first link against movement in said X-Y plane, and at least one other of said fingers moveable in said X-Y plane about one of said rotary joints.

18. (original) The self-contained, practical robotic device of claim 17, wherein said at least one other finger comprises two of said fingers that are both rotatable in the X-Y plane between positions aligned with, and positions opposable to, said X-Y plane fixed finger.

19. (previously presented) The self-contained, practical robotic device according to claim 16, wherein said objects are elongated in a first direction, said base also extends in said first

direction, and said at least one finger comprises at least two fingers that are mutually spaced along said first direction and oriented to grip the elongated object against said base surface.

20. (original) The self-contained, practical robotic device of claim 19, wherein said base is a fixture and wherein said objects are workpieces that are each releasably held on said fixture by said at least one finger for processing.

21. (currently amended) The self-contained, practical robotic device of claim 10 wherein said at least one sensor responsive to said vision parameter is mounted on the exterior of said robotic [[hand]]device to provide to said distributed control network real time vision information about the objects and their relationship to the robotic device.

22. (currently amended) The self-contained, practical robotic device of claim 10 wherein said sensor comprises at least one pair of an electromagnetic radiation source and an electromagnetic radiation transducer responsive to the output of said source, said sensor pair being positioned on said robotic [[hand]]device to detect the objects.

23. (original) The self-contained, practical robotic device of claim 22 wherein said sensor pairs are positioned and said robotic device for ranging to the objects and triangulation of said ranging information to locate the objects with respect to the robotic device.

24. (original) The self-contained, practical robotic device of claim 10 wherein said sensor comprises a force transducer mounted on the robotic device to detect contact of the robotic device with the object and said output signal is input to said distributed control network to back drive said actuators in response to said contact.

25. (currently amended) A [[self, contained]]self-contained, practical robotic device of claim 11 wherein said brushless motor has a housing, a rotor that extends axially in one direction exterior to the motor housing, and bearings that rotatably support the rotor solely at its exterior extending portion.

26. (previously presented) The self-contained, practical robotic device of claim 25 wherein said exterior extending portion carries a worm gear and wherein said link rotated by said brushless motor at said associated rotary joint is secured to a gear that engages said worm gear so that rotation of said rotor produces a corresponding, reduced rotation of said associated link about the axis of said associated rotary joint.

27. (currently amended) The self-contained, practical robotic [[hand]]device of claim 26 wherein said wiring is spiral wound within each said rotary joint.

28. (original) The self-contained, practical robotic device of claim 10 wherein said sensor comprises light emitters and light detectors mounted on the device and located to sense the presence of an object within the grasp of the robotic device.

29. (original) The self-contained, practical robotic device of claim 10 wherein said sensors comprise light emitters and light detectors mounted in pairs on the tips of the outermost of said links of each of said fingers and said network controller operates them to measure distance to an object.

30. (original) The self-contained, practical robotic device of claim 1 further comprising at least one gripping pad having a V-groove formed therein.

31. (previously presented) The self-contained, practical robotic device of claim [[5]]15 further comprising a fingernail-like gripping plate secured at the end of each of said angled links, said gripping plates providing a V-groove for edge-gripping and locating the objects.

Cancel claims 32-38.